**Department of Energy**
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221

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NMED Hazardous
Waste Bureau

Mr. Steve Zappe, WIPP Project Leader
Hazardous Waste Permits Program
New Mexico Environment Department
2905 E. Rodeo Park Drive, Bldg. 1
Santa Fe, NM 87505

Subject: Transmittal of Approved RFETS WSPF Number RF033.01, TRU Sand, Slag, and Crucible Heel

Dear Mr. Zappe:

The Department of Energy, Carlsbad Field Office (CBFO) has approved the Rocky Flats Environmental Technology Site (RFETS) Waste Stream Profile Form (WSPF) RF033.01, TRU Sand, Slag, and Crucible Heel.

Enclosed is a copy of the approved form as required by Section B-4(b)(1) of the WIPP Hazardous Waste Facility Permit, No. NM4890139088-TSDF.

If you have any questions on this matter, please contact me at (505) 234-7357 or (505) 706-0066.

Sincerely,

Kerry W. Watson, Director
Office of Characterization and Transportation

Enclosure

cc: w/o enclosure
J. Kieling, NMED
C. Walker, TechLaw
M. Strum, WTS *ED
R. Chavez, WRES *ED
L. Greene, WRES
S. Calvert, CTAC *ED
WIPP Operating Record
CBFO M&RC

*ED denotes Electronic Distribution

040850

CBFO:NTP:KWW:VW:04-1912:UFC:5822

**Waste Stream Profile Number:** RF033.01

Generator site name: RFETS | Technical contact: Eric D'Amico

Generator site EPA ID: CO7890010526 | Phone number: (303) 966-5362

Date of audit report approval by NMED: March 9, 2000 as amended February 6, 2001; May 24, 2001; June 5, 2001; April 5, 2002; April 8, 2002; August 20, 2002; August 29, 2002; December 20, 2002; April 8, 2003; September 19, 2003; December 30, 2003 and July 14, 2004

Title, version number, and date of documents used for WAP certification: Rocky Flats Environmental Technology Site TRU Waste Characterization Program Quality Assurance Project Plan, 95-QAPjP-0050, Version 9, February 2004. Transuranic (TRU) Waste Management Manual, Version 7, 1-MAN-008-WM-001, February 2004. Contact-Handled Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant, Revision 1.0, March 2004.

Did your facility generate this waste? ☑ Yes ☐ No If no, provide the name and EPA ID of the original generator:

## Waste Stream Information[1]

WIPP ID: RF-MR-0393, RF-MT-0393

Summary Category Group: S3000 | Waste Matrix Code Group: Solidified Inorganics

Waste Stream Name: TRU Sand Slag and Crucible Heel[2]

Description from the WTWBIR: This waste form consists of material that is fine particles to larger chunks. There is sand, and crucible shards from the break-out process.[2]

Defense TRU Waste: ☑ Yes ☐ No

Check one: ☑ CH ☐ RH Number of SWBs N/A Number of Drums 119 Number of Canisters N/A

Batch Data Report numbers supporting this waste stream characterization: See Table 7.

List applicable EPA Hazardous Waste Codes: None

Applicable TRUCON Content Codes: RF 130A/230A, RF 130B/230B, RF 130BA/230BA, RF 130D/230D, RF 130DF/230DF, RF 130E/230E, RF 130F/230F, RF 130G/230G, RF 130GF/230GF, RF 130H/230H, RF 130I/230I, RF 130J/230J, RF 130K/230K, RF 130N/230N, RF 130P/230P, RF 130PA/230PA, RF 130PF/230PF, RF 130PAF/230PAF, RF 130Q/230Q, RF 130R/230R, RF 130RF/230RF, RF 130S/230S, RF 130SF/230SF, RF 130T/230T, RF 130U/230U, RF 130V/230V, RF 130VF/230VF

## Acceptable Knowledge Information[1]

Required Program Information

- Map of site: Reference List, No. 3
- Facility mission description: Reference List, No. 3
- Description of operations that generate waste: Reference List, Nos. 1, 2, 3, 6
- Waste identification/categorization schemes: Reference List, Nos. 13, 14
- Types and quantities of waste generated: Reference List, Nos. 1, 2, 3, 6
- Correlation of waste streams generated from the same building and process, as appropriate: Reference List, Nos. 1, 2, 6
- Waste certification procedures: Reference List, No. 5

Required Waste Stream Information

- Area(s) and building(s) from which the waste stream was generated: Reference List, Nos. 1, 2, 6
- Waste stream volume and time period of generation: Reference List, Nos. 4, 6
- Waste generating process description for each building: Reference List, Nos. 1, 2, 6
- Process flow diagrams: Reference List, Nos. 1, 2
- Material inputs or other information identifying chemical/radionuclide content and physical waste form: Reference List, Nos. 1, 2, 3, 6
- Which Defense Activity generated the waste: (Check one) Reference List, No. 3

☑ Weapons activities including defense inertial confinement fusion
☐ Naval Reactors development
☐ Verification and control technology
☐ Defense research and development
☐ Defense nuclear waste and material by products management
☐ Defense nuclear materials production
☐ Defense nuclear waste and materials security and safeguards and security investigations

Supplemental Documentation:

- Process design documents: Note 3
- Standard operating procedures: Note 3
- Safety Analysis Reports: Note 3
- Waste packaging logs: Note 3
- Test plans/research project reports: Note 3
- Site data bases: Note 3
- Information from site personnel: Note 3
- Standard industry documents: Note 3
- Previous analytical data: Note 3
- Material safety data sheets: Note 3
- Sampling and analysis data from comparable/surrogate Waste: Note 3
- Laboratory notebooks: Note 3

Sampling and Analysis Information[1]

*[For the following, when applicable, enter procedure title(s), number(s) and date(s)]*

☑ Radiography: Reference List, Nos. 21, 22, 23
☑ Visual Examination: Reference List, Nos. 17, 24, 25, 26, 27
☑ Headspace Gas Analysis
VOCs: Reference List, No. 7, 19, 20
Flammable: Reference List, No. 7, 19, 20
Other gases (specify): N/A
☑ Homogeneous Solids/Soils/Gravel Sample Analysis
Total metals: Reference List, Nos. 10, 11, 12
PCBs: N/A
VOCs: Reference List, No. 8
— Nonhalogenated VOCs: Reference List, No. 8
Semi-VOCs: Reference List, No. 9
Other (specify): N/A

**Waste Stream Profile Form certification:**

I hereby certify that I have reviewed the information in this Waste Stream Profile Form, and it is complete and accurate to the best of my knowledge. I understand that this information will be made available to regulatory agencies and that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

| | | |
|---|---|---|
| RBallenger for<br>Signature of Site Project Manager | G. A. O'Leary, Manager TRU Programs<br>Printed Name and Title | 8/2/04<br>Date |
| C. L. Ferrera<br>Signature of Site QA Officer | C. L. Ferrera, TWCP Site QAO<br>Printed Name and Title | 8/2/04<br>Date |

NOTE (1) Use back of sheet or continuation sheets, if required.
(2) The waste stream name and description in the WTWBIR are incorrect as item description code (IDC) 393 has been re-characterized as non-hazardous, and the waste stream is heel (i.e., undissolved solids) remaining after dissolution of sand, slag, and crucible material in nitric acid.
(3) See the References section in the Acceptable Knowledge Summary (attached) for additional backup documentation associated with this waste stream.

## REFERENCE LIST

1. Backlog Waste Reassessment Baseline Book, Waste Form 59, Calcium Metal and Sand, Slag, and Crucible, June 2004.
2. Waste Stream and Residue Identification and Characterization (WSRIC), Version 7, April 2004, and archived versions.
3. RFETS TRU Waste Acceptable Knowledge Supplemental Information, RF/RMRS-97-018, Revision 13, May 2004.
4. Waste and Environmental Management System (WEMS) database.
5. Transuranic (TRU) Waste Certification, PRO-X05-WC-4018, Version 7, March 2004.
6. Acceptable Knowledge TRU/TRM Waste Stream Summaries, RMRS-WIPP-98-100, Section 6.14, Revision 15, June 2004.
7. GC/MS Determination of Volatile Organics Waste Characterization, L-4111-X, January 2002.
8. GC/MS Determination of Volatile Organic Compounds (Solids, Liquids, and TCLP Extracts), L-4165- M, March 2003.
9. GC/MS Determination of Total SVOCs for WIPP, L-4215-F, March 2003.
10. Waste Analysis by Atomic Absorption Spectroscopy, L-4151-L, October 2003.
11. Mercury Analysis in Waste (Cold-Vapor Technique), L-4152- L, October 2003.
12. Trace Metals by ICP Spectrometry (Solids, Liquids, and TCLP Extracts), L-4153-J, October 2003.
13. Waste Characterization, Generation, and Packaging, 1-PRO-079-WGI-001, Revision 4, May 2002.
14. Waste Characterization Program Manual, 1-MAN-036-EWQA-Section 1.6.1, Revision 3, May 2002.
15. Interoffice Memorandum from Thomas R. Gatliffe to Eric L. D'Amico, Headspace Gas Analysis Data Evaluation Report For Waste Stream Profile RF033.01 (TRU Sand, Slag, and Crucible Heel), Lot 1, TRG-190-04, June 2004.
16. Interoffice Memorandum from Thomas R. Gatliffe to Eric L. D'Amico, Statistical Solid Analysis Data Evaluation Report For Waste Stream Profile RF033.01 (TRU Sand, Slag, and Crucible Heel) Lot 1, TRG-089-04, March 2004.
17. TRU/TRM Waste Visual Verification ($V^2$) and Data Review, PRO-1031-WIPP-1112, Version 3, March 2004.
18. Interoffice Memorandum from V. S. Sendelweck to E. L. D'Amico, Tentatively Identified Compounds in TRU Sand, Slag, and Crucible Heel Lot 1, VSS-007-2004, March 2004.
19. Headspace Gas Sampling And Analysis Using An Automated Manifold, L-4231-F, March 2002
20. Headspace Gas Sampling and Analysis Using An On-Line Integrated System, PRO-1676-HGAS-S&A, Version 2, January 2004.
21. Real-Time Radiography Testing of Transuranic and Low-Level Waste, 4-W30-NDT-00664, Version 10, March 2004.
22. Real-Time Radiography Testing of Transuranic and Low-Level Waste in Building 569, 4-I19-NDT-00569, Revision 5, January 2002.
23. Mobile Real-Time Radiography Testing of Transuranic and Low-Level Waste, PRO-1520-Mobile-RTR, Version 3, March 2004.
24. Glovebox and C-Cell Waste Operations, PRO-1358-440-VERP, Version 6, March 2004.
25. RTR Visual Examination Confirmation, Building 371, PRO-1608-VECRTR-371, Revision 0, October 2002.
26. Visual Examination for Confirmation of RTR, 4-H80-776-ASRF-007, Revision 5, June 2001.
27. Repack Sampling, Building 371, PRO-860-RS-0156, Revision 1, January 2001.
28. Interoffice Memorandum from E. L. D'Amico to WIPP Records, Solid Sampling Control Chart Effectiveness Evaluation for Waste Stream RF033.01, ELD-019-04, February 2004.

## Form A
## Reconciliation with Data Quality Objectives

I certify by signature (below) that sufficient data have been collected to determine the following Program-required waste parameters:

**WSPF # RF033.01**

| Item | Check Box[a] | Reconciliation Parameter |
|---|---|---|
| 1 | ✓ | Waste Matrix Code as reported in WEMS. |
| 2 | ✓ | Waste Material Parameter Weights for individual containers as reported in WEMS. |
| 3 | ✓ | The waste matrix code identified is consistent with the type of sampling and analysis used to characterize the waste. |
| 4 | ✓ | Container mass and activities of each radionuclide of concern as reported in WEMS. |
| 5 | ✓ | Each waste container of waste contains TRU radioactive waste. |
| 6 | ✓ | Mean concentrations, $UCL_{90}$ for the mean concentrations, standard deviations, and the number of samples collected for each VOC in the headspace gas of waste containers in the waste stream/waste stream lot. |
| 7 | ✓ | Mean concentrations, $UCL_{90}$ for the mean concentrations, standard deviations, and number of samples collected for VOCs in the waste stream/waste stream lot. Summary Categories S3000 and S4000. |
| 8 | ✓ | Mean concentrations, $UCL_{90}$ for the mean concentrations, standard deviations, number of samples collected for SVOCs in the waste stream/waste stream lot. Summary Categories S3000 and S4000. |
| 9 | ✓ | Mean concentrations, $UCL_{90}$ for the mean concentrations, standard deviations, and number of samples collected for metals in the waste stream/waste stream lot. Summary Categories S3000 and S4000. |
| 10 | ✓ | Sufficient number of samples was taken to meet statistical sampling requirements. |
| 11 | ✓ | Only validated data were used in the above calculations, as documented through the site data review and validation forms and process. |
| 12 | ✓ | Waste containers were selected randomly for sampling, as documented in site procedures. |
| 13 | ✓ | The potential flammability of TRU waste headspace gases. |
| 14 | ✓ | Sufficient number of waste containers was visually examined to determine with a reasonable level of certainty that the $UCL_{90}$ for the miscertification rate is less than 14 percent. |
| 15 | ✓ | Whether the waste stream exhibits a toxicity characteristic (TC) under 40 CFR Part 261, Subpart C. |
| 16 | ✓ | All TICs were appropriately identified and reported in accordance with the requirements of the WIPP WAP prior to submittal of a waste stream profile form for a waste stream or waste stream lot. |
| 17 | ✓ | The overall completeness, comparability, and representativeness QAOs were met for each of the analytical and testing procedures as specified in the WIPP WAP Sections B3-2 through B3-9 prior to submittal of a waste stream profile form for a waste stream or waste stream lot. |
| 18 | ✓ | The RTLs (i.e., PRQLs) for all analyses were met prior to submittal of a waste stream profile form for a waste stream or waste stream lot. |
| 19 | ✓ | Appropriate packaging configuration and DAC were met and documented in the headspace gas sampling documentation and the drum age was met prior to sampling. |
| 20 | ✓ | Whether the waste stream can be classified as hazardous or non-hazardous at the 90-percent confidence limit. |

[a] Check (✓) indicates that data or acceptable knowledge are sufficient to determine the waste parameters and that the waste parameters have been reported in the listed document or database. N/A indicates parameter does not apply to waste stream. NO indicates data are insufficient.

R Ballenger for — Signature of Site Project Manager

G. A. O'Leary — Printed Name

8/2/04 — Date

**Data Summary Report—Table 1: Solid Sampling Summary**

**WSPF # RF033.01**

**Determination of Number of Retrievably Stored Waste Containers to Sample (S3000,S4000)**

Preliminary Estimates of Mean, Variance, and Coefficient of Variation:

Attach a table(s) that correlates container identification numbers to data packages if different from containers used for characterization.

Description of Source Data: Preliminary samples were collected and analyzed in compliance with all requirements (specified in the WIPP Waste Analysis Plan Section B2-2a) for being counted as part of the total number of calculated required samples. Sufficient preliminary samples were collected to demonstrate sampling sufficiency – i.e., collection of additional samples other than the preliminary samples was not required. See Reference List, No 16.

Samples Randomly Selected from Waste Stream (yes/no)? Yes.

Treatment of less-than-detectable measurements: This pertains only to data for analytes in which at least one detectable measurement was obtained. Data were evaluated using one half the method detection limit (MDL) for less-than-detectable observations. See Reference List, No. 16.

Analytes that are listed spent solvents and therefore not included in the calculation to determine the number of containers to sample: None.

Largest Calculated Sample Size selection and associated analyte: Pertains only to toxicity characteristic or listed waste analytes and only to those analytes where the associated EPA hazardous waste number is not assigned (i.e., it only applies to those cases where a site intends to establish that the constituent is below the regulatory threshold and the associated EPA hazardous waste number does not apply). Largest value is 0.126 for cadmium.

Minimum number of containers to sample: 5 (based on WIPP Waste Analysis Plan Section B2-2a requirement that preliminary estimates be based on samples from a minimum of 5 waste containers).

Attach preliminary estimates: See Reference List, No. 16. Preliminary estimates are identical to final results because sufficient preliminary samples were collected and analyzed in compliance with all requirements for being used as required samples.

**Data Summary Report—Table 1: Solid Sampling Summary (continued)**

**WSPF # RF033.01**

**Retrievably Stored Waste Sampling Results**

Analytes that are listed spent solvents and therefore not included in the $UCL_{90}$ estimate calculation to determine the toxicity characteristic: None.

Largest Calculated Sample Size and associated analyte: Pertains only to toxicity characteristic or listed waste analytes and only to those analytes where the associated EPA hazardous waste number is not assigned (i.e., it only applies to those cases where a site intends to establish that the constituent is below the regulatory threshold and the associated EPA hazardous waste number does not apply). Largest value is 0.126 for cadmium.

Comparison of largest calculated sample size with largest calculated sample size selected from preliminary estimate: 0.126 vs. 0.126 (for cadmium)

Treatment of less-than-detectable measurements: This pertains only to data for analytes in which at least one detectable measurement was obtained. Data were evaluated using one half the method detection limit (MDL) for less-than-detectable observations. See Reference List, No. 16.

Transformations applied to data and justification: Logarithmic or Square Root transformations were applied to the data as necessary to achieve (or better achieve) a normal probability distribution of the data for $UCL_{90}$ comparison to RTL values.

Drums overpacked for shipment/WWIS tracking (Yes/No)? No.
If yes, overpack container identification number: _____

Sampled drums included in waste stream lot reported here (Yes/No)? Yes.
If no, WSPF # including sampled drums: _____

**Newly Generated Waste Sampling Results**

Batch or continuous process? N/A[a]

Samples randomly selected from Waste Stream? (yes/no) N/A[a]

Sample locations (part of process): N/A[a]

Treatment of less-than-detectable measurements: N/A[a]

Transformations applied to data and justification: N/A[a]

**NOTES:**

[a] Control charting for this waste stream was determined not to be applicable and sampling and analysis was conducted using the retrievably-stored characterization strategy (see Reference 28).

**Data Summary Report—Table 2: Headspace Gas Summary Data**

**WSPF # RF033.01**

**Sampling and Analysis Method (check one):**

☐ 100% Sampling ☑ Reduced Sampling

**2A**

| ANALYTE[a] | # Samples[b] | Transform Applied[c] | Normality Test (Pass/Fail)[d] | Min. Sample Size[d] | Max. Value (ppmV) | Mean[d] | Std. Dev.[d] | $UCL_{95}$[d] | Trans-formed RTL[e] | Un-Transformed RTL[e] (ppmV) | EPA Code[f] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | 0 | | | | 2.6 | 1.271 | | | | 10 | |
| 1,2-Dichloroethane | 0 | | | | 2.7 | 1.233 | | | | 10 | |
| 1,1-Dichloroethylene | 0 | | | | 3.2 | 1.392 | | | | 10 | |
| cis-1,2-Dichloroethylene | 0 | | | | 3.2 | 1.496 | | | | 10 | |
| trans-1,2-Dichloroethylene | 0 | | | | 2.5 | 1.208 | | | | 10 | |
| 1,1,2,2-Tetrachloroethane | 0 | | | | 3.4 | 1.388 | | | | 10 | |
| 1,1,1-Trichloroethane | 0 | | | | 2.9 | 1.429 | | | | 10 | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 0 | | | | 2.6 | 1.154 | | | | 10 | |
| 1,2,4-Trimethlybenzene | 0 | | | | 2.4 | 1.2 | | | | NA | |
| 1,3,5-Trimethylbenzene | 0 | | | | 2.9 | 1.242 | | | | NA | |
| Acetone | 0 | | | | 36 | 15.292 | | | | 100 | |
| Benzene | 0 | | | | 2.7 | 1.225 | | | | 10 | |
| Bromoform | 0 | | | | 2.3 | 1.15 | | | | 10 | |
| Butanol | 0 | | | | 33 | 13.583 | | | | 100 | |
| Carbon disulfide | 0 | | | | 3.6 | 1.571 | | | | 10 | |
| Carbon tetrachloride | 0 | | | | 2.9 | 1.45 | | | | 10 | |
| Chlorobenzene | 0 | | | | 2.8 | 1.088 | | | | 10 | |
| Chloroform | 0 | | | | 2.5 | 1.208 | | | | 10 | |
| Cyclohexane | 0 | | | | 3.4 | 1.533 | | | | NA | |
| Ethyl benzene | 0 | | | | 2.1 | 1.008 | | | | 10 | |
| Ethyl ether | 0 | | | | 3.5 | 1.563 | | | | 10 | |
| Methanol | 0 | | | | 30 | 12.708 | | | | 100 | |
| Methyl ethyl ketone | 0 | | | | 34 | 15.333 | | | | 100 | |
| Methyl isobutyl ketone | 0 | | | | 25 | 11.25 | | | | 100 | |
| Methylene chloride | 0 | | | | 3.0 | 1.417 | | | | 10 | |
| o-Xylene | 0 | | | | 2.6 | 1.175 | | | | 10 | |
| m,p-Xylene | 0 | | | | 4.9 | 2.179 | | | | 10 | |
| Tetrachloroethylene | 0 | | | | 2.5 | 1.25 | | | | 10 | |
| Toluene | 2 | Log | Fail[g] | 0.0284 | 6.3 | 0.39 | 0.581 | 0.619 | 4.2769 | 72.02[h] | |
| Trichloroethylene | 0 | | | | 2.4 | 1.096 | | | | 10 | |

**NOTES:**

[a] A total of 12 samples were collected and analyzed. Analysis was performed for all analytes identified. Samples were not composited.

[b] Identifies the number of samples in which the associated analyte was detected.

[c] Identifies the type of data transformation used, if applicable, to achieve (or better achieve) a normal probability distribution of the data.

**Data Summary Report—Table 2: Headspace Gas Summary Data (continued)**

**NOTES (continued):**

[d] Statistics calculated based on using ½ the MDL for less-than-detectable observations with data transformation as identified (Reference 15). When transformation was applied, the Mean and $UCL_{90}$ values presented are the transformed values (Reference 15). With no detectable concentrations, listed mean reflects average of one-half of reported MDL values for analyte and calculation of standard deviation and $UCL_{90}$ values is not meaningful. With fewer than five detectable concentrations, calculated values for $UCL_{90}$ are subject to potentially large relative error.

[e] RTLs for headspace gas analysis results correspond to the analyte PRQL for analytes that are WIPP WAP target analytes. "NA" means the analyte is not a WIPP WAP target analyte, but instead a flammable VOC that is analyzed for compliance with the TRUPACT-II Authorized Methods for Payload Control (TRAMPAC).

[f] No entry indicates that the respective $UCL_{90}$ value did not exceed the associated RTL.

[g] Data set (with or without transformation) did not pass the test for normality. The data set that most approximated a normal distribution was used for computation of statistics.

[h] Limit used for evaluation of EPA Hazardous Waste Code for toluene (Reference No. 3).

**Data Summary Report—Table 2: Headspace Gas Summary Data (continued)**

**WSPF # RF033.01**

**2B**

| TENTATIVELY IDENTIFIED COMPOUND (TIC) | Maximum Observed Estimated Concentration (ppmV) | # Samples Containing TIC |
|---|---|---|
| No TICs identified in the headspace gas samples for the waste stream lot. | | |
| | | |
| | | |
| | | |
| | | |

Did the data verify the acceptable knowledge? ☑ Yes ☐ No

Data as reported in Data Summary Report – Table 2 confirms acceptable knowledge in that no EPA codes are applicable.

If not, describe the basis for assigning the EPA Hazardous Waste Codes:

## Data Summary Report—Table 3: Metals Summary Data

**WSPF # RF033.01**

**Sampling and Analysis Method/Units (check one):**

☐ Totals (units are in mg/kg) ☑ TCLP (units are in mg/l)

| ANALYTE[a] | # Samples[b] | Transform Applied[c] | Normality Test (Pass/Fail)[d] | Min. Sample Size[d] | Mean[d] | $UCL_{90}$[d] | Transformed RTL[e] | Un-Transformed RTL[e] (mg/L) | EPA Code[f] |
|---|---|---|---|---|---|---|---|---|---|
| Antimony | 2 | Log | Fail[g] | 0.007 | -1.75 | -1.61 | 1.609 | 5 | |
| Arsenic | 1 | Log | Fail[g] | 0.002 | -1.843 | -1.8 | 1.6 | 5 | |
| Barium | 10 | Log | Pass | 0.018 | -1.443 | -1.1 | 4.6 | 100 | |
| Beryllium | 0 | | | | 0.008 | | | 5 | |
| Cadmium | 9 | Log | Fail[g] | 0.126 | -2.594 | -2.063 | 0 | 1 | |
| Chromium | 11 | Log | Pass | 0.031 | -1.45 | -1.164 | 1.609 | 5 | |
| Lead | 2 | Log | Fail[g] | 0.007 | -2.425 | -2.27 | 1.609 | 5 | |
| Mercury | 8 | None | Fail[g] | 0.000 | 0.004 | 0.005 | N/A | 0.2 | |
| Nickel | 14 | None | Pass | 0.000 | 0.731 | 0.898 | N/A | 5 | |
| Selenium | 0 | | | | 0.015 | | | 1 | |
| Silver | 0 | | | | 0.045 | | | 5 | |
| Thallium | 1 | Log | Fail[g] | 0.004 | -1.816 | -1.705 | 1.609 | 5 | |
| Vanadium | 0 | | | | 0.075 | | | 5 | |
| Zinc | 14 | None | Fail[g] | 0.000 | 1.131 | 1.313 | N/A | 5 | |

Did the data verify the acceptable knowledge? ☑Yes ☐ No

Data as reported in Data Summary Report – Table 3 confirms acceptable knowledge in that no toxicity characteristic metal EPA codes are applicable.

If not, describe the basis for assigning the EPA Hazardous Waste Codes.

**NOTES:**

[a] A total of 14 samples were collected and analyzed. Analysis was performed for all analytes identified.
[b] Identifies the number of samples in which the associated analyte was detected.
[c] Identifies the type of data transformation used, if applicable, to achieve (or better achieve) a normal probability distribution of the data.
[d] Statistics calculated based on using ½ the MDL values for all less-than-detectable observations with data transformation as identified (Reference 16). When transformation was applied, the Mean and $UCL_{90}$ values presented are the transformed values (Reference 16). No entry indicates no detectable measurements available for statistics.
[e] RTLs correspond to the analyte PRQL for analytes that are not characteristic hazardous waste constituents.
[f] No entry indicates that the applicable $UCL_{90}$ value did not exceed the associated RTL.
[g] Data transformation did not pass the test for normality. The data transformation that most approximated a normal distribution was used for computation of statistics.

## Data Summary Report—Table 4: Total VOC Summary Data

**WSPF # RF033.01**

**4A**

| ANALYTE[a] | # Samples[b] | Transform Applied[c] | Normality Test (Pass/Fail)[d] | Min. Sample Size[d] | Mean[d] | $UCL_{90}$[d] | Transformed RTL[e] | Un-Transformed RTL[e] (mg/kg) | EPA Code[f] |
|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethylene | 0 | | | | 0.5 | | | 14 | |
| trans-1,2-Dichloroethylene | 0 | | | | 0.5 | | | 10 | |
| 1,2-Dichloroethane | 0 | | | | 0.5 | | | 10 | |
| 1,1,1-Trichloroethane | 0 | | | | 0.5 | | | 10 | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 0 | | | | 0.5 | | | 10 | |
| 1,1,2-Trichloroethane | 0 | | | | 0.5 | | | 10 | |
| 1,1,2,2-Tetrachloroethane | 0 | | | | 0.5 | | | 10 | |
| Acetone | 0 | | | | 5 | | | 100 | |
| Benzene | 0 | | | | 0.5 | | | 10 | |
| Bromoform | 0 | | | | 0.5 | | | 10 | |
| Butanol | 0 | | | | 5 | | | 100 | |
| Carbon disulfide | 0 | | | | 0.5 | | | 10 | |
| Carbon tetrachloride | 0 | | | | 0.5 | | | 10 | |
| Chloroform | 0 | | | | 0.5 | | | 120 | |
| Chloromethane | 0 | | | | 0.5 | | | 10 | |
| Chlorobenzene | 0 | | | | 0.5 | | | 10 | |
| Ethyl benzene | 0 | | | | 0.5 | | | 10 | |
| Ethyl ether | 0 | | | | 5 | | | 100 | |
| Isobutanol | 1 | Log | Fail[g] | 0.012 | 1.672 | 1.756 | 4.605 | 100 | |
| Methanol | 0 | | | | 5 | | | 100 | |
| o-Xylene | 0 | | | | 0.5 | | | 10 | |
| m,p-Xylene | 0 | | | | 0.964 | | | 10 | |
| Methyl ethyl ketone | 0 | | | | 5 | | | 4,000 | |
| Methylene chloride | 0 | | | | 0.5 | | | 10 | |
| Tetrachloroethylene | 0 | | | | 0.5 | | | 14 | |
| Toluene | 0 | | | | 0.786 | | | 10 | |
| Trichloroethylene | 0 | | | | 0.5 | | | 10 | |
| Trichlorofluoromethane | 0 | | | | 0.5 | | | 10 | |
| Vinyl chloride | 0 | | | | 0.5 | | | 4 | |

**NOTES:**

[a] A total of 14 samples were collected and analyzed. Analysis was performed for all analytes identified except for trans-1,2-dichloroethylene. Solid sampling and analysis was conducted on one of the 14 containers prior to the addition of trans-1,2-dichloroethylene to the target analyte list.

[b] Identifies the number of samples in which the associated analyte was detected.

[c] Identifies the type of data transformation used, if applicable, to achieve (or better achieve) a normal probability distribution of the data.

[d] Statistics calculated based on using ½ the MDL values for all less-than-detectable observations with data transformation as identified (Reference 16). No entry indicates no detectable measurements available for statistics.

**Data Summary Report—Table 4: Total VOC Summary Data (continued)**

**NOTES (continued):**

[e] RTLs correspond to the analyte PRQL for analytes that are F-listed hazardous waste constituents or to the applicable total RTL value as calculated from the TC RTL. RTLs correspond to the analyte PRQL for analytes that are not F-listed or characteristic hazardous waste constituent.
[f] No entry indicates that the applicable $UCL_{90}$ value did not exceed the associated RTL.
[g] Data transformation did not pass the test for normality. The data transformation that most approximated a normal distribution was used for computation of statistics.

**Data Summary Report—Table 4: Total VOC Summary Data (continued)**

**WSPF # RF033.01**

**4B**

| TENTATIVELY IDENTIFIED COMPOUND (TIC) CHEMICAL ABSTRACTS SERVICE (CAS) Number | Maximum Observed Estimated Concentration (mg/kg) | # Samples Containing TIC |
|---|---|---|
| Methyl bromide (CAS No. 74-83-9) | 0.11 | 1 |
| | | |
| | | |

No TIC listed in 40 CFR 261, Appendix VIII was detected in greater than or equal to 25 percent of the waste containers sampled.

Did the data verify acceptable knowledge? ☑ Yes ☐ No

Data as reported in Data Summary Report – Table 4 confirm acceptable knowledge in that no toxicity characteristic organic or F-listed solvent EPA codes, are applicable.

If no, describe the basis for assigning EPA Hazardous Waste Codes.

## Data Summary Report—Table 5: Total SVOC Summary Data

**WSPF # RF033.01**

5A

| ANALYTE[a] | # Samples[b] | Transform Applied[c] | Normality Test (Pass/Fail)[d] | Min. Sample Size[d] | Mean[d] | $UCL_{90}$[d] | Transformed RTL[e] | Un-Transformed RTL[e] (mg/kg) | EPA Codes[f] |
|---|---|---|---|---|---|---|---|---|---|
| 1,2-Dichlorobenzene | 0 | | | | 2.357 | | | 10 | |
| 1,4-Dichlorobenzene | 0 | | | | 2.357 | | | 150 | |
| 2,4-Dinitrophenol | 1 | Log | Fail[g] | 0.00 | 0.95 | 0.995 | 3.689 | 40 | |
| 2,4-Dinitrotoluene | 0 | | | | 0.146 | | | 2.6 | |
| 2-Methylphenol (o-Cresol) | 0 | | | | 2.357 | | | 40 | |
| 3-&4-Methylphenol (m,p-Cresol) | 0 | | | | 2.357 | | | 40 | |
| Acetophenone | 0 | | | | 0.5 | | | 40 | |
| Hexachlorobenzene | 0 | | | | 0.146 | | | 2.6 | |
| Hexachloroethane | 0 | | | | 2.357 | | | 60 | |
| Nitrobenzene | 0 | | | | 2.357 | | | 40 | |
| Pentachlorophenol | 0 | | | | 2.357 | | | 2,000 | |
| Pyridine | 0 | | | | 2.357 | | | 100 | |

NOTES:

[a] A total of 14 samples were collected and analyzed. Analysis was performed for all analytes identified except for acetophenone. Solid sampling and analysis was conducted on one of the 14 containers prior to the addition of acetophenone to the target analyte list due to its detection in another Rocky Flats waste stream.

[b] Identifies the number of samples in which the associated analyte was detected.

[c] Identifies the type of data transformation used, if applicable, to achieve (or better achieve) a normal probability distribution of the data.

[d] Statistics calculated based on using ½ the MDL values for all less-than-detectable observations with data transformation as identified (Reference 16). No entry indicates no detectable measurements available for statistics.

[e] RTLs correspond to the analyte PRQL for analytes that are F-listed hazardous waste constituents or to the applicable total RTL value as calculated from the TC RTL. RTLs correspond to the analyte PRQL for analytes that are not F-listed hazardous waste constituents or characteristic hazardous waste constituents.

[f] No entry indicates that the applicable $UCL_{90}$ value did not exceed the associated RTL.

[g] Data transformation did not pass the test for normality. The data transformation that most approximated a normal distribution was used for computation of statistics.

**Data Summary Report—Table 5: Total SVOC Summary Data (continued)**

**WSPF # RF033.01**

**5B**

| TENTATIVELY IDENTIFIED COMPOUND (TIC) CHEMICAL ABSTRACTS SERVICE (CAS) Number | Maximum Observed Estimated Concentration (mg/kg) | # Samples Containing TIC |
|---|---|---|
| 1-Butene, 2-chloro-3-mehyl- (CAS No. 17773-64-7) | 1.1 | 1 |
| Oleamide (CAS No. 301-02-0)[a] | 0.9 | 5 |
| Decanoic acid (CAS No. 334-48-5) | 0.5 | 1 |
| Octadecanoic acid (CAS No. 57-11-4) | 0.4 | 1 |
| Chloroiodomethane (CAS No. 593-71-5) | 0.7 | 1 |
| 1,2-Benzenedicarboxylic acid (CAS No. 603-11-2) | 0.8 | 1 |
| 1,1,1,2-Tetrachloroethane (CAS No. 630-20-6)[b] | 0.6 | 7 |
| Pentachloroethane (CAS No. 76-01-7) | 0.7 | 3 |
| 1,1,2-Trichloroethane (CAS No. 79-00-5) | 0.78 | 1 |
| Dichloroacetyl chloride (CAS No. 79-36-7) | 0.4 | 1 |
| 1,2-Benzenedicarboxylic acid, dibutyl ester (CAS No. 84-74-2) | 0.6 | 1 |

Did the data verify acceptable knowledge? ☑ Yes ☐ No

Data as reported in Data Summary Report – Table 5 confirm acceptable knowledge in that no toxicity characteristic organic or F-listed solvent EPA codes are applicable.

If no, describe the basis for assigning EPA Hazardous Waste Codes.

**NOTES:**

[a] TIC was detected in 25 percent or more of the samples, but is not listed in 40 CFR 261, Appendix VIII and so was not added to the target analyte list for the waste stream.

[b] TIC was detected in 25 percent or more of the samples and is listed in 40 CFR 261, Appendix VIII, but the TIC is identified as a volatile organic compound (VOC) in Method 8260B and as such was not added to the SVOC target analyte list. The TIC was not identified during the solid VOC analysis and so it was not added to the VOC target analyte list. The TIC was determined not to be a listed hazardous waste based on comparison of the TIC identification to acceptable knowledge (see Reference No. 18).

## Data Summary Report—Table 6: Exclusion of Prohibited Items

**WSPF # RF033.01**

The absence of prohibited items is documented through acceptable knowledge. Radiography or visual examination is performed on each container in this waste stream to verify the absence of the following prohibited items:

- Liquid waste (waste shall contain as little residual liquid as is reasonably achievable by pouring, pumping and/or aspirating, and internal containers shall contain less than 1 inch or 2.5 centimeters of liquid in the bottom of the container. Total residual liquid in any payload container (e.g., 55 gallon drum or standard waste box) may not exceed 1 percent volume of that container.)
- Non-radionuclide pyrophoric materials
- Waste incompatible with backfill, seal and panel closure materials, container and packaging materials, shipping container materials, or other wastes
- Explosives or compressed gases
- Waste exhibiting the characteristics of ignitability, corrosivity or reactivity
- Non-mixed hazardous waste

Newly generated waste is characterized by visual verification (VV) at the time of waste packaging using the visual examination (VE) technique unless the use of radiography in lieu of, or in combination with, visual verification is justified by any of the following criteria:

- Visual verification was conducted during packaging, but was unacceptable,
- Visual verification requires extensive handling of high gram content waste that results in high radioactive exposure for the VV personnel,
- Situations where waste packaging is conducted at numerous locations generating small quantities of transuranic waste requiring a large number of VV personnel, and/or
- Where waste was originally packaged as low-level waste, but subsequently determined to be transuranic.

Each container of waste is certified and shipped only after radiography and/or VE either:

- Did not identify any prohibited items in the waste container, or
- All prohibited items found in a waste container by radiography or VE are identified and corrected (i.e., eliminated or removed) through the site non-conformance reporting system.

## Data Summary Report—Table 7: Correlation of Container Identification to Batch Data Reports

**WSPF # RF033.01**

| Package No. | Inner Can No. | Radioassay Data Package | Solid Sample Batch No.[a] | Metals Data Package[a] | VOC Data Package[a] | SVOC Data Package[a] | Headspace Sample Batch No.[b] | Headspace VOC Data Package[b] | RTR Data Package[c] | VE or VV Data Package[d] |
|---|---|---|---|---|---|---|---|---|---|---|
| DB8653 | Z82575<br>Z82580 | CALG-DP-01426<br>CALG-DP-01450 | | | | | 04W0286 | HGAS-DP-01002 | 6T2080 | |
| DB8923 | Z82604<br>Z82623<br>Z82640 | CALG-DP-01480<br>CALG-DP-01478<br>CALG-DP-01481 | | | | | 04W0277 | HGAS-DP-00993 | 6T-2095 | |
| DB8931 | Z82577<br>Z82592 | CALG-DP-01478<br>CALG-DP-01473 | | | | | 04W0288 | HGAS-DP-01004 | 6T-2187 | |
| DB8942 | Z82599<br>Z82617<br>Z82618 | CALG-DP-01473<br>CALG-DP-01475<br>CALG-DP-01479 | | | | | 04W0286 | HGAS-DP-01002 | MT0077 | |
| DB8997 | Z82627<br>Z82630<br>Z82642 | CALG-DP-01484<br>CALG-DP-01480<br>CALG-DP-01479 | | | | | 04W0287 | HGAS-DP-01003 | 6T-2084 | |
| DB9778 | Z82791<br>Z82792<br>Z82793 | 371TG2-DP-021301<br>371TG2-DP-021301<br>371TG2-DP-021301 | | | | | 04W0286 | HGAS-DP-01002 | 6T-2188 | |
| DC0065 | Z82845<br>Z82846<br>Z82847 | 371TG2-DP-021601<br>371TG2-DP-021601<br>371TG3-DP-021701 | | | | | 04W0287 | HGAS-DP-01003 | 6T2079 | |
| DC0335 | Z82583<br>Z82588 | 371TG2-DP-062601<br>371TG2-DP-062601 | | | | | 04W0286 | HGAS-DP-01002 | MT0077 | |
| DC0664 | Z82565<br>Z82567<br>Z82570 | CALG-DP-01429<br>CALG-DP-01445<br>CALG-DP-01448 | | | | | 04W0288 | HGAS-DP-01004 | 6T-2188 | |
| DC2789 | Z83102<br>Z83103<br>Z83104 | 371TG3-DP-091701<br>371TG3-DP-091701<br>371TG2-DP-081801 | SC-SB-1000<br>SC-SB-1000<br>SC-SB-1000 | MTLS-DP-00020<br>MTLS-DP-00020<br>MTLS-DP-00020 | VOCS-DP-00027<br>VOCS-DP-00027<br>VOCS-DP-00027 | SVOA-DP-00033<br>SVOA-DP-00033<br>SVOA-DP-00033 | | | | AR-DP-082<br>AR-DP-082<br>AR-DP-082 |
| DC3118 | Z83099<br>Z83100<br>Z83101 | 371TG2-DP-080201<br>371TG3-DP-072701<br>371TG3-DP-072701 | SC-SB-1001<br>SC-SB-1001<br>SC-SB-1001 | MTLS-DP-00019<br>MTLS-DP-00019<br>MTLS-DP-00019 | VOCS-DP-00026<br>VOCS-DP-00026<br>VOCS-DP-00026 | SVOA-DP-00034<br>SVOA-DP-00034<br>SVOA-DP-00034 | | | | AR-DP-082<br>AR-DP-082<br>AR-DP-082 |
| DC3131 | Z82585<br>Z83098 | CALG-DP-01473<br>371TG2-DP-072701 | SC-SB-1001 | MTLS-DP-00019 | VOCS-DP-00026 | SVOA-DP-00034 | 04W0286 | HGAS-DP-01002 | MT0078 | |

## Data Summary Report—Table 7: Correlation of Container Identification to Batch Data Reports (continued)

| Package No. | Inner Can No. | Radioassay Data Package | Solid Sample Batch No.[a] | Metals Data Package[a] | VOC Data Package[a] | SVOC Data Package[a] | Headspace Sample Batch No.[b] | Headspace VOC Data Package[b] | RTR Data Package[c] | VE or VV Data Package[d] |
|---|---|---|---|---|---|---|---|---|---|---|
| DC3548 | Z83105 | 371TG2-DP-082001 | SC-SB-1000 | MTLS-DP-00020 | VOCS-DP-00027 | SVOA-DP-00033 | | | | AR-DP-082 |
| | Z83106 | 371TG2-DP-082001 | SC-SB-1000 | MTLS-DP-00020 | VOCS-DP-00027 | SVOA-DP-00033 | | | | AR-DP-082 |
| | Z83097 | CALG-DP-01694 | SC-SB-1001 | MTLS-DP-00019 | VOCS-DP-00026 | SVOA-DP-00034 | | | | AR-DP-082 |
| DC3559 | Z83108 | 371TG2-DP-082001 | SC-SB-1000 | MTLS-DP-00020 | VOCS-DP-00027 | SVOA-DP-00033 | | | | AR-DP-082 |
| | Z83109 | 371TG2-DP-082001 | SC-SB-1000 | MTLS-DP-00020 | VOCS-DP-00027 | SVOA-DP-00033 | | | | AR-DP-0 |
| | Z83107 | 371TG2-DP-082001 | SC-SB-1000 | MTLS-DP-00020 | VOCS-DP-00027 | SVOA-DP-00033 | | | | AR-DP-( |
| DD3050 | Z26306 | 371TG3-DP-051702 | | | | | 04W0209 | HGAS-DP-00926 | | DR-DP-155 |
| | Z26307 | 371TG3-DP-051002 | | | | | | | | DR-DP-155 |
| | Z26308 | 371TG3-DP-051702 | | | | | | | | DR-DP-155 |
| | Z26309 | 371TG3-DP-050902 | | | | | | | | DR-DP-155 |
| | Z26310 | 371TG3-DP-051002 | | | | | | | | DR-DP-155 |
| | Z26312 | 371TG3-DP-051002 | | | | | | | | DR-DP-155 |
| | Z26313 | 371TG3-DP-051002 | | | | | | | | DR-DP-155 |
| | Z26314 | 371TG3-DP-051702 | | | | | | | | DR-DP-155 |
| | Z26315 | 371TG3-DP-051702 | | | | | | | | DR-DP-155 |
| DD9538 | Z22773 | 440IP1-DP-100303 | | | | | | | | DR-DP-155 |
| | Z83253 | 440IP1-DP-100303 | SC-SB-1002 | MTLS-DP-00029 | VOCS-DP-00034 | SVOA-DP-00054 | 04W0172 | HGAS-DP-00888 | | AR-DP-088 |
| | | | | | | | | | | DR-DP-156 |

[a] No entry indicates container was not selected or used for solid sampling.
[b] No entry indicates container was not selected or used for reduced headspace sampling.
[c] No entry indicates the container was characterized using visual verification.
[d] No entry indicates the container was characterized using radiography and not selected for visual examination to confirm radiography.

## Acceptable Knowledge Summary

**WSPF # RF033.01**

RMRS-WIPP-98-100, Acceptable Knowledge TRU/TRM Waste Stream Summaries, Section 6.14, TRU Sand, Slag, and Crucible Heel (attached).

Rocky Flats Environmental Technology Site

ACCEPTABLE KNOWLEDGE INFORMATION

# ACCEPTABLE KNOWLEDGE TRU/TRM WASTE STREAM SUMMARIES

## RMRS-WIPP-98-100

## Section 6.14

## TRU Sand, Slag, and Crucible Heel

## Profile No. RF033.01

## Revision 17

Reviewed for Classification/UCNI
By: Unclassified Not UCNI*
*Reference Exemption Number CEX-032-00
Date: August 5, 2004

Approval signatures in Site Document Control history file

## 6.14 TRU Sand, Slag, and Crucible Heel

**Profile No. RF033.01**

## Acceptable Knowledge Waste Stream Summary

Waste Stream Name: TRU Sand, Slag, and Crucible Heel

Generation Buildings: Buildings 371, 440, and 771[6,7,9]

Waste Stream Volume (Retrievably Stored): 119 55-gallon drums[6,9]

Generation Dates (Retrievably Stored): January 1988 – June 2004[6,9]

NOTE: This waste stream includes repackaged retrievably stored waste.

Waste Stream Volume (Newly Generated): None [9]

Generation Dates (Newly Generated): N/A [9]

Waste Stream Volume (Projected): None [9]

Generation Dates (Projected): N/A [9]

TRUCON Content Code [1]: RF 130A/230A, RF 130B/230B, RF 130BA/230BA, RF 130D/230D, RF 130DF/230DF, RF 130E/230E, RF 130F/230F, RF 130G/230G, RF 130GF/230GF, RF 130H/230H, RF 130I/230I, RF 130J/230J, RF 130K/230K, RF 130N/230N, RF 130P/230P, RF 130PA/230PA, RF 130PF/230PF, RF 130PAF/230PAF, RF 130Q/230Q, RF 130R/230R, RF 130RF/230RF, RF 130S/230S, RF 130SF/230SF, RF 130T/230T, RF 130U/230U, RF 130V/230V, RF 130VF/230VF

Process knowledge demonstrates flammable volatile organic compounds (VOCs) in headspace <500 ppm: Yes (see Section 6.14.6)

### 6.14.1 Transuranic Waste Baseline Inventory Report Information [2]

WIPP Identification Number(s): RF-MR-0393, RF-MT-0393

Summary Category Group: S3000 Waste Matrix Code Group: Solidified Inorganics

Waste Matrix Code: S3119 Waste Stream Name: Sand, Slag, and Crucible/TRM

Description from the WTWBIR: This waste form consists of material that is fine particles to larger chunks. There is sand, and crucible shards from the break-out process.

NOTE: The information in the Waste Isolation Pilot Plant Transuranic Waste Baseline Inventory Report (WTWBIR) is incorrect. The waste stream name and description are incorrect as item description code (IDC) 393 has been re-characterized as non-hazardous, and the waste stream is heel (i.e., undissolved solids) remaining after dissolution of sand, slag, and crucible material in nitric acid.

## 6.14.2 Waste Stream Description

This waste stream consists of transuranic (TRU) heel (i.e., undissolved solids) remaining after dissolution of sand, slag, and crucible (SS&C) material in nitric acid [item description code (IDC 393)] and TRU heel that was subsequently repackaged/processed (IDC 393R). This material was generated from plutonium recovery and waste and residue repackaging operations. The material is similar in material, physical form, and hazardous constituents, and is therefore considered a single waste stream. Table 6.14-1 presents the waste matrix codes and waste material parameters for TRU SS&C heel.[3]

**Table 6.14-1, Sand, Slag, and Crucible Heel Description**

| IDC | IDC Description | Waste Matrix Code | Waste Material Parameters | Weight % (Average) |
|---|---|---|---|---|
| 0393 | Sand, Slag, and Crucible Heel | S3119, Unknown/Other Inorganic Particulates | Other Inorganic Materials | 100% |
| 393R | SS&C Heel Repack/Processed | S3119, Unknown/Other Inorganic Particulates | Other Inorganic Materials | 100% |

Notes:

The above waste material parameters address the waste material only and do not include internal packaging (e.g. inner bags, metal cans or plastic bottles), container packaging (e.g. fiberboard liner), absorbent, secondary waste, etc.

***IDC 393, Sand, Slag, and Crucible Heel:*** Undissolved solids from dissolution of pulverized magnesium oxide sand, calcium fluoride slag, and magnesium oxide crucible (IDCs 396 and 398) in nitric acid. The solids are collected by filtration of plutonium nitrate solution, dried, then packaged for storage pending disposal or further dissolution.[4,7]

***IDC 393R, SS&C Heel Repack/Processed:*** Repackaged/blended sand, slag, and crucible heel (IDC 393). These materials may be blended with reagent grade magnesium oxide sand. An "R" has been appended to this IDC to indicate the waste material has been repackaged/processed.[5]

## 6.14.3 Areas of Operation

TRU sand, slag, and crucible heel were generated by the following defense operations:[3,4,5,6,7]

- Plutonium Recovery
- Waste and Residue Repackaging

6.14.4 Generation Processes

TRU sand, slag, and crucible heel (IDC 393) was historically generated in the Low-Level Dissolution Process conducted in Room 149, Gloveboxes 23 and 25 of Building 771. Pulverized sand, slag, and crucible (IDCs 396 and 398) from the Crushing and Grinding Process were dissolved with heated nitric acid and aluminum nitrate. The resulting plutonium nitrate solution was filtered to remove the undissolved solids. The solids, or heel, were dried and packaged in 4-liter or smaller polyethylene bottles as IDC 393. Following assay, residue heels were recycled to the Low-Level Dissolution Process, and waste heel packaged for disposal. See Backlog Waste Reassessment (BWR) Baseline Book, Waste Form 59, Figure 2.3 for a process flow diagram showing historical generation of sand, slag, and crucible heel.[4]

TRU repackaged/processed SS&C heel (IDC 393R) was generated from residue repackaging operations in Building 371 to meet Interim Safe Storage Criteria (ISSC) and WIPP Waste Acceptance Criteria (WAC) requirements. SS&C heel residues required blending to meet WIPP requirements (e.g., Pu concentration, FGE, etc.). Disposition of the residue material was evaluated as described in the *Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site*, DOE/EIS 0277-F. DOE approval for Rocky Flats processing the material for disposal at WIPP is documented in the *Record of Decision on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site* and the *Amendment to the Record of Decision on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site.*[5,12,13,14]

For residue materials the containers of SS&C heel were brought into a glovebox, the contents emptied into a pan where foreign materials (e.g., nuts, bolts, tape, etc.) were removed. High and low plutonium concentration SS&C was combined to ensure that safeguard termination limits are not exceeded. If sufficient amounts of low plutonium concentration SS&C were not available for blending, a reagent grade magnesium oxide sand was added to decrease the concentration of fissile material. The blended SS&C was then placed into a new metal can (4-liter or smaller). The can containing the blended SS&C was bagged out of the glovebox in filtered bags and staged for non-destructive assay (NDA) to ensure that WIPP WAC and safeguards requirements were met. The cans were then packaged into pipe overpack components and staged for additional WIPP confirmatory testing and eventual shipment. Process flow diagrams for waste and residue repackaging processes are included in Waste Stream and Residue Identification and Characterization (WSRIC) Process 371-25.[5]

Waste containers of SS&C heel (IDC 393) are also repackaged in Building 440, as necessary, to meet WIPP-WAC requirements. The process flow diagram for this waste repackaging process is included in WSRIC Process 440STOR-11.[7]

Section B-3a(1)(ii) of the WIPP WAP allows for reduced headspace gas sampling for thermally treated waste streams. Specifically, a waste stream may qualify for reduced headspace gas sampling if it complies with the following three criteria:

- The waste stream or waste stream lot must consist of more than 10 containers.
- The waste stream must have either been generated using a high-temperature thermal process or been subjected to a high-temperature thermal process after generation that resulted in the reduction of matrix-related VOCs in the headspace to concentrations below the PRQLs in Permit Attachment B3, Table B3-2.
- The site must have documentation demonstrating that high-temperature thermal processes were used.

The TRU SS&C heel waste stream complies with each of these criteria as follows:

- The waste stream consists of 119 containers of waste.[9]
- Feed materials to the low-level dissolution process (SS&C) were generated from plutonium metal reduction and button breakout. The heat generated by the reduction reaction yielded molten plutonium metal and calcium fluoride slag and the temperatures involved (over 640 °C) would have effectively removed VOCs and semi-VOCs that may have been present in the waste matrix. The SS&C heel was generated from the further processing, by dissolution, of the pulverized SS&C in steam heated nitric acid at 100 °C. There were no VOCs introduced as part of the initial reagents, processing, or subsequent handling of the material. Confirmatory headspace gas sampling of a random selection of 12 containers from the waste stream demonstrates that the concentrations of matrix-related VOCs in the headspace gas is below their associated PRQLs.[10]
- Reference 8 provides the acceptable knowledge documentation of the high-temperature thermal processes used.

## 6.14.5 Resource Conservation and Recovery Act (RCRA) Characterization

This waste stream is **NOT** characterized as a mixed waste. As described in Section 6.14.2, this waste is generated from similar activities; is similar in material, physical form, and hazardous constituents; and is, therefore, considered a single waste stream. The specific BWR Baseline Book Subpopulations and WSRIC Process Numbers associated with the TRU sand, slag, and crucible heel waste stream are listed in the WEMS AK Waste Stream Summary for Profile Number RF033.01.[6]

Visual examination of waste contents at the time of packaging and/or RTR is used to verify that the waste stream is not liquid waste and does not contain explosives, non-radionuclide pyrophoric materials, compressed gasses, or reactive waste. Therefore, this waste stream does not exhibit the characteristics of ignitability (D001), corrosivity (D002), or reactivity (D003).

TRU SS&C heel is not RCRA-regulated hazardous waste. RCRA-regulated organic and metal compounds were not used in any of the generating or repackaging processes.

As described in the WTWBIR, this material was conservatively assigned U.S. Environmental Protection Agency (EPA) hazardous waste number (D007) for chrome potentially present from corrosion of stainless steel in the dissolution process area. However, the waste was subsequently characterized as nonhazardous based on the acceptable knowledge that the aggressive dissolution of sand, slag, and crucible residues in a series of nitric acid baths followed by rinsing and vacuum filtering, it is highly unlikely that any chromium remaining in the heel would leach using the toxicity characteristic leachate procedure (TCLP) extraction method. Confirmatory solid samples in Lot 1 were analyzed for toxicity characteristic leachate procedure (TCLP) metal, and total VOC and SVOC constituents. Statistics were calculated based on using one-half the method detection limit (MDL) for less-than-detectable observations with data transformation applied where appropriate. Using this "WIPP directed" method, the calculated 90 percent upper confidence limit ($UCL_{90}$) of the mean concentrations did not exceed its associated PRQL value for any of the analytes. Therefore, the solid sampling data confirms the acceptable knowledge characterization that no toxicity characteristic or F-listed EPA codes are applicable. [2,4,5,7,11]

No discarded chemical products, off-specification species, chemical residues, and spill residues thereof (40 Code of Federal Regulations (CFR) 261.33) were included in this waste stream, and no hazardous waste from specific sources (40 CFR 261.32) was generated at the site. Therefore, no K-, U-, or P-listings have been applied to this waste stream. [4,5,7]

Beryllium parts were used in the manufacture/assembly of weapons components, and residual beryllium contamination of plutonium parts may have occurred. TRU SS&C Heel associated with these operations may have been contaminated with beryllium; and, therefore, trace quantities (less than one weight percent) of beryllium may be present in the waste stream. Any beryllium present is a contaminant of the process; is not unused commercial chemical product; and, therefore, is not a P015-listed waste.[5]

Headspace gas sampling and analysis detected one VOC (toluene). Statistics were calculated based on using one-half the method detection limit (MDL) for less-than-detectable observations with data transformation applied where appropriate. Using this "WIPP directed" method, the calculated 90 percent upper confidence limit ($UCL_{90}$) of the mean concentrations for none of the analytes were found to exceed their associated PRQL value. Therefore, the headspace data confirms the acceptable knowledge characterization that no characteristic volatile organic or F-listed solvent EPA codes are applicable.[10]

## 6.14.6 Transportation

The payload containers in the waste stream must also comply with the TRUPACT-II Authorized Methods for Payload Control (TRAMPAC) requirements. Flammable VOCs were not identified in this waste stream based on the process descriptions in the *BWR Baseline Book* and *WSRIC Building Books*. Therefore, flammable VOCs in the payload container headspace do not exceed 500 ppm.[4,5,7]

## 6.14.7 Radionuclides

Table 6.14-2 summarizes the radionuclides present in sand, slag, and crucible heel.[3]

**Table 6.14-2, Sand, Slag, and Crucible Heel Radionuclides**

| IDC | Description | Radionuclides | Rationale |
|---|---|---|---|
| 0393 | Sand, Slag, and Crucible Heel | WG Pu, Am-241, EU, Np-237 | The source of radionuclides for this IDC is from the dissolution of sand, slag, and crucible in nitric acid. |
| 393R | SS&C Heel Repack/Processed | WG Pu, Am-241, EU, Np-237 | The source of radionuclides for this IDC is from the repackaging/processing of IDC 393. |

Key:
| | |
|---|---|
| WG Pu | weapons grade plutonium |
| Am-241 | americium-241 |
| EU | enriched uranium |
| Np-237 | neptunium-237 |

Note: Am-241, EU, and Np-237 may be present as due to ingrowth of WG Pu.[3]

## 6.14.8 References

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2. DOE 1995. Transuranic Waste Baseline Inventory Report, Revision 2. DOE/CAO-95-1121.

3. RMRS 2004. RFETS TRU Waste Acceptable Knowledge Supplemental Information. RF/RMRS-97-018, Revision 13.

4. RFETS 2000. Backlog Waste Reassessment Baseline Book, Waste Form 59, Calcium Metal and Sand, Slag, and Crucible.

5. RFETS 2003. Waste Stream and Residue Identification and Characterization Building 371, Version 7.0.

6. Waste and Environmental Management System (WEMS) database.

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10. Interoffice Memorandum from Thomas R. Gatliffe to Eric L. D'Amico, Headspace Gas Analysis Data Evaluation Report For Waste Stream Profile RF033.01 (TRU Sand, Slag, and Crucible Heel), Lot 1, TRG-190-04, June 2004.

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13. DOE 1998. Record of Decision on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site, Federal Register, 63 FR 66136, November 25, 1998.

14. DOE 1999. Amendment to a Record of Decision on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site, Federal Register, 64 FR 47780, August 25, 1999.